DEVELOPMENT OF SCIENCE LEARNING MODULE BASED ETHNOSCIENCE ON JENANG KUDUS FOR CLASS VIII SMP/MTs

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Abstract Science learning will be more meaningful if there is continuity between the science material enjoyed and real-life activities in the student's environment. One of them is developing teaching materials that utilize local cultural wisdom that exists in the daily lives of students as learning resources in supporting the achievement of competencies and goals in science learning. This study aims to determine the development and placement of science learning modules based on the ethnoscience of jenang Kudus in additive substance. This research is a development or R&D research with a Thiagarajan 4D model covering the stages of defining, designing (design), developing (development), and disseminating (disseminate), but this research is only limited to 3 stages, namely define (defining), design (designing), develop (development). The subjects of this research trial were 15 students of class VIII at SMP 4 Kudus. This research produces a product in the form of a module as a teaching material in science learning based on the ethnoscience of jenang Kudus on additive substance. Stages of design the cover using the Canva application and filling out the module using Microsoft Word. The module specifications include: the characteristics of the physical module, the material module, additive substance material, and the content module, which is based on ethnoscience. The modules developed can be very feasible to be used in learning, as shown by the results of validation by media experts and material experts who each obtained percentage results of 95.83% with "very good" and 84.44% in the "very good" category and for teacher and student responses to the development of this module obtained a percentage result of 90.33% respectively with the criteria of very good and 92.75% with the criteria of very good.
Keywords Module; Ethnoscience; Additive Substance

A. **INTRODUCTION**

Education is an important component to support a life. Education is used to develop their potential actively so that they have spiritual strength, self-control, intelligence, noble character, and useful skills in society. In general, the purpose of education is to help achieve the level of maturity of the development of their students and develop the potential that has been developed. The learning process is the relationship between teachers and students either directly or indirectly in achieving learning objectives. In general, the purpose of education is to help achieve the level of maturity of the development of their students and develop the potential that has been developed.

Learning process is the relationship between teachers and students either directly or indirectly in achieving learning objectives. The science learning process has two components, namely content and process. Components related to knowledge, the process of a skill or skill needed to acquire, apply, and produce knowledge. The science learning process in SMP/MTs applies learning that includes the fields of chemistry, biology, and physics (Ningtyas, E, Sumarni, and Christijanti, 2014). Science learning in schools is expected to be more fun for students who

actively involve students through the applicable curriculum (Ulfah and Hidayati 2019). One way to improve learning is to develop teaching materials that are tailored to the needs of students to understand and explore material according to their potential.

However in reality, only a few schools implement the use of teaching materials in the form of learning modules. Based on initial observations at SMP 4 Kudus, science learning uses handbooks and Student Worksheets (LKS) as learning resources and there are no accompanying teaching materials in the form of modules. The books and worksheets used have not led to learning based on the daily lives of students. Likewise, the material in the books and worksheets is classified as less interesting and does not present the local culture of the local area. The impression of students that learning at school tends to be boring, lacks understanding of the material being studied, becomes passive, and is less interested in learning. Science is very close to the daily lives of students and can be studied in all aspects of local cultures (Sudarmin 2014). Currently, there are still many Indonesian cultures that are not yet known by Indonesian citizens, especially students. Students only know the name of the culture, but do not know the history and science of it. Science learning related to culture aims to make students learn about the existing culture, the natural surroundings, and its application in the surrounding environment.

Previous researchers have carried out research and development of ethnoscience modules including Massita Rhoida Nailiyah conducted in 2016, with the title "Development of Ethnoscience-Based Science Modules in Jember Regency on the Theme Cultivation in Junior High Schools". made feasible to use, and in the field test showed that the module got a percentage of 95.6% so it had an effective module category (Nailiyah, Subiki, and Wahyuni 2016). Research and development of the ethnoscience module of Niken Purnama Sari, Suhirman, and Ahmad Walid., which was conducted in 2020. The research resulted in the achievement of the feasibility of the module in very feasible and practical criteria to be used as a guidebook or teaching material in the learning process (Sari et al. 2020).

Module is designed according to the environment around the students of class VIII at SMP 4 Kudus which is close to the Jenang Kudus production site. Teachers can link learning materials with local wisdom that exists in the daily lives of students, namely jenang Kudus. The culture of jenang Kudus can be related to additive substance material in science learning in SMP/MTs. Additive substance contains dyes, preservatives, sweeteners, flavoring and other sub-materials which can be classified as natural and artificial (Andriyani, Masriani, and Muharini 2017). Learning will be more meaningful when the material is connected to the surrounding environment to provide insight for teachers and students so that it is practical and useful in their lives. Students will experience learning that is based on the awareness that the culture around their environment is a basic or important part of education as an expression and exchange of ideas and knowledge. Therefore, it is necessary to develop modules as a complement to existing teaching materials, researchers are interested in carrying out research with the title "Development of Science Learning Modules Based Ethnoscience on Jenang Kudus for Class VIII SMP/MTs".

B. **METHODS**

This research is a type of research and development that uses Research and Development (R&D) research methods. Research and Development (R&D) method is a research method used to produce a particular product and test the effectiveness of the module. The development model that the researcher uses is a 4-D development model which is modified into 3D. The stages of the 4D model include define, design, develop, and disseminate (Wardani and Widiana 2018). In this research and development, researchers carried out a simplification stage, namely the dissemination stage, which was not carried out due to consideration of the limitations of researchers and time constraints. This research and development will be carried out at SMP 4 Kudus with the subject of development research in the form of a science learning module based on the Jenang Kudus ethnoscience that uses additive substance, which is class VIII students.

Product trial process was carried out once, the subjects to trial were 15 students of class VIII. Data analysis techniques in this study are qualitative and quantitative analysis techniques. Qualitative data, namely data in the form of descriptions. This data was obtained from input from media expert validators and material experts at the time of product validation in the form of input criticism and suggestions, while quantitative data was useful for describing the results of

developing products obtained from statistical data in the form of calculations or formulating numbers through the validation results of the expert team and student responsesAnalisis data kelayakan produk. Data for filling out this questionnaire uses a Likert scale method with 4 choices in the form of numbers/scores, namely 4, 3, 2, and 1. This quantitative data is then qualitatively validated in order to conclude the validity of the developed module. The results of this questionnaire or questionnaire were analyzed using the assessment criteria for instruments with a Likert scale in Table B1 below :

Table B1. Classification of Assessment Criteria for Instruments

No.	Category (Rating)	Score
1.	Very Decent/ Very Good/ Very Interesting	4
2.	Decent/ Good/ Interesting	3
3.	Decent enough/ Good enough/ Interesting enough	2
4.	Less Worthy / Less Good / Less Attractive	1

The scores obtained from the questionnaire/questionnaire of media experts, material experts, science teacher responses, and student responses were then converted to determine the percentage of module eligibility, as for the percentage formula as follows: (Arsih and Ahda 2017)

$$P = \frac{\Sigma x}{\Sigma xi} \text{ x } 100 \text{ \%}$$

To calculate the average score of each component of the assessment aspect using the following equation:

$$\text{Percentage of respondents} = \frac{\text{Total score obtained}}{\text{Total maximum/ highest score}} \text{ x } 100 \text{ \%}$$

The scale of media experts, material experts, teacher responses, and student responses in determining the quality and usefulness of the resulting product After knowing the calculation results, then they are converted/transformed into qualitative sentences and identified according to the eligibility categorization criteria in Table B2 below.

Table B2. Eligibility Percentage

Percentage Score Range (%)	Category
81% - 100%	Very Decent/ Very Good/ Very Interesting
61% - 80%	Decent/ Good/ Interesting
41% - 60%	Decent enough/ Good enough/ Interesting enough
21% - 40%	Less Worthy / Less Good / Less Attractive
0% - 20%	Not Worthy / Not Good / Not Attractive

C. **RESULT & DISCUSSION**

The result of this research is a science learning module based on the ethnoscience of jenang Kudus on additive substance for class VIII SMP/MTs. The research location is in SMP 4 Kudus. This research and development focuses on developing appropriate and interesting modules as science teaching materials. The first stage is define (definition) which is done by identifying problems obtained from observations and interviews at SMP 4 Kudus. This activity is used in the science learning process that teaching materials in the form of textbooks and worksheets come from school creativity, not from teacher development itself. This causes students to pay less attention to the teacher's explanation, less active, and less interested in learning science. Therefore, students need learning materials in the form of modules that lead to students' lives such as local culture so that students can easily learn the material so that learning becomes more interesting and meaningful. One of the interesting teaching materials is a module related to daily life, containing local local culture so that students can understand concepts and increase knowledge of science in their area.

Development of material discussed in the module is adjusted to the Core Competencies (KI) and Basic Competencies (KD) of science subjects for class VIII. The material discussed is additive and addictive substances in KD 3.6 explaining various additive substance in food and beverages, and KD 4.6 writing a paper on the impact of abuse of additive and addictive substances on health. The choice of additive substance is because it is related to the process of making holy jenang. In

addition, the application of these additive substance in the surrounding environment is still difficult. Sub-chapters of science-related materials in the holy jenang include dyes, sweeteners, preservatives, flavorings and aromas, and thickeners. After developing the material, the next step is to design the module.

Next stage of design is to make a module design. The module components at least contain a review of subjects, introductions, learning activities, practice questions, summaries, self-assessments, and answer keys. In making the module design, the researcher used several techniques to compose the science module. The following is a design carried out by researchers to develop a science learning module based on the ethnoscience of Jenang Kudus on additive substance material for class VIII SMP/MTs.

(1) Looking for a syllabus about additive substance material that is used as a benchmark in the development of science learning modules.
(2) Collect illustrations, pictures or videos related to additive substance and Jenang Kudus.
(3) Initial design of the module
(4) Design stage, the researcher first designs the initial design in the form of activities in the module. The initial design of the module is:
   a. Cover
      This cover design is made to provide an overview of what students will learn. The cover of this module is designed using the Canva application, while the fonts used are Sunday, and Open Sans Extra Bold. The module design is designed with the format (1) Cover with the title " Science Learning Modules Based Ethnoscience of Jenang Kudus on additive substance material," equipped with the IAIN Kudus logo, module title, name of researcher, class, and semester presented in the Image C1.

Image C1. Module Cover Design

   b. Module Contents
      This module explains the material additive substance and their relationship to the ethnoscience of additive substance presented in the module. The content of the module is designed by using Microsoft Word. The material in this module presents a description of additive substance material related to the local wisdom of Jenang Kudus, which can be seen in Image C1.

Image C1. Component of Jenang Kudus Ethnoscience Materials

This learning module is structured by taking into account the characteristics of a good module, namely self-instruction (self-study). The module must contain instructions for using the module, basic competencies, learning objectives, concept maps, practice questions, evaluations, and answer keys, so that students can learn actively (Nilasari et al. 2016), and build their own knowledge, with minimal guidance from educators. The module contains all substances, namely the definition of additive substance, types of additive substance, effects and solutions of additive substance. This shows that the module has fulfilled the independent characteristics (intact). The science learning module must also meet stand-alone characteristics, namely the use of this module does not require other lessons to be used simultaneously, and meets the easy-to-use characteristics, namely the module is prepared using simple language and sentences that are easily accessible by students.

The next, development: this stage aims to produce a product module that is revised and then validated to provide assessments, suggestions, products by media experts and material experts who are science lecturers at IAIN Kudus.). The results of the validation will be the basis for revisions and improvements to the learning tools developed and tested through teacher responses and student responses. The following are the results of expert validation :

1. Media Expert Validation

The development of this science learning module was validated by a media expert, namely Mr. Henry Setya Budhi, M.Pd who is a Tadris lecturer in Natural Sciences, Tarbiyah Faculty, Kudus State Islamic Institute. The following are the results of media expert data validation, which can be seen in Table C1.

Table C1. Media Expert Validation Results

No	Aspect	Total Score	Average	Percentage (%)	Criteria
1.	Appearance	36	4	100%	Very Good
2.	Contents	12	4	100%	Very Good
3.	Laguange	11	3,66	91,67%	Very Good
4.	Aspects of use	11	3,66	91,66%	Very Good
	Totals	**70**	**3,83**	**95,83%**	**Very Good**

Based on Table C1, the results of the Jenang Kudus ethnoscience-based module assessment are reviewed on the aspect of appearance with a percentage of 100% with very good criteria, content aspect of 100% with very good criteria, language aspect 91.67% with very good criteria, and aspects of usage 91.66 % with very good criteria. %, this shows that the module has clear instructions for use, the material is presented clearly, the size and type of font is easy to read, and the practical module will make it easier for students to learn the module anywhere. The results of the media expert validation questionnaire, this module obtained a percentage rating of 95.83% with very valid eligibility criteria.

2. Material Expert Validation

The development of this science learning module was validated by a material expert, namely Mrs. Ulya Fawaida, M.Pd who is a lecturer in Natural Sciences, Tarbiyah Faculty, Kudus State Islamic Institute. The material expert validation questionnaire statement contains 26 statement items with a score range of 1 to 4. The assessment aspect contains content aspects, presentation aspects, contextual learning and ethnoscience aspects, and language aspects. The results of the validity by material experts can be seen in Table C2.

Table C2. Material Expert Validation Results

No	Aspects	Totals score	Average	Percentage (%)	Criteria
1.	Contents	30	3,3	83,33%	Very Good
2.	Presentation	17	3,4	85%	Very Good
3.	Contextual learning and ethnoscience	28	3,1	77,78%	Good
4.	Language	11	3,6	91,67%	Very Good
Totals		**86**	**3,36**	**84,44%**	**Very Good**

Based on Table C2, the results of material expert validation are obtained with assessment results from the content aspect of 83.33%, presentation aspect 85%, contextual learning and ethnoscience aspects 77.78%, language aspect 91.67%. Obtained the average result of all aspects with a percentage of 84.44% with the criteria of "Very Good." This shows that the module is in accordance with the learning objectives achieved, uses good, interesting language, and is equipped with pictures or illustrations that help explain the material in the module (Gustinasari, M., Lufri 2017).

3. The response of science teacher and response of students

The science teacher response to the science learning module aims to be based on the results of the assessment of the product developed by the researcher. The trial was carried out at SMPN 4 Kudus. The science teacher who became the respondent in this development was Mrs. Nur Hidayah K, S.Pd who was a science teacher at SMP 4 Kudus. The science teacher response questionnaire revealed 30 statement items with a score range of 1 to 4. The following data on the results of the science teacher responses can be seen in Table C3.

Tabel C3. Science Teacher Response Results

No	Aspects	Total Score	Average	Percentage (%)	Criteria
1.	Aspects of Learning Materials	22	3,6	91,67%	Very Good

No	Aspects	Total score	Average	Percentage (%)	Criteria
2.	Appearance	14	3,5	87,5%	Very Good
3.	Effectiveness Aspect	17	3,4	85%	Very Good
4.	Presentation Aspect	19	3,8	95%	Very Good
5.	Aspects of Contextual Learning, and Ethnoscience	37	3,7	92,5%	Very Good
Totals			**3,6**	**90,33%**	**Very Good**

Based on Table C3, the results of the trial on the science teacher's response obtained the results of the assessment of the learning material aspects, the percentage was 91.67%, the display aspect was 87.5%, the effectiveness aspect was 85%, the presentation aspect was 95% and the contextual and ethnoscience learning aspects were 92.5 %. From the natural science teacher response trial, the total score was 109 out of a maximum value of 120 and a feasibility value of 90.33% with the criteria of "very good". The science teacher's response received several inputs or suggestions stating that the module design was good and attractive, and equipped with pictures and practice questions to determine the students' understanding ability. The science teacher, Mrs. Nur Hidayah K, S.Pd, was of the opinion that the module is easy to use in learning and has an attractive appearance, the material associated with Jenang Kudus in the module is appropriate, well packaged and can be used in learning activities (Prabowo, Ibrohim, and Saptasari 2016).

After conducting a science teacher response trial, the researcher also conducted a student response test for the developed product which involved 15 class VIII students at SMP 4 Kudus. This research trial begins by introducing the product, explaining the contents of the product, and filling out a questionnaire. The student response questionnaire used was 22 items. Aspects of student responses contain details of aspects of material, language, and interest. The following are the results of product trials in Table C4.

Table C4. Student Response Results

No	Aspects	Total score	Average	Percentage (%)	Criteria
1.	Tampilan	282	3,76	94%	Very Good
2.	Materi	323	3,58	89,72%	Very Good
3.	Bahasa	113	3,76	94,17%	Very Good
4.	Ketertarikan	503	3,72	93,14%	Very Good
Totals			**3,7**	**92,75%**	**Very Good**

Based on Table C4, the results of trials on student responses with assessment results from the material aspect of the display 94%, the material aspect 89.72%, the language aspect 94.17% and the interest aspect 93.14%. From the test of student responses, the total score was 1221 from a maximum value of 1320, namely the product feasibility value was 92.75% and included the criteria of "very good." Students think that the module is easy to learn because the instructions for using the module are easy to follow, use understandable language and sentences, attractive color combinations, pictures/illustrations can clarify the material in the module, self-assessment is also easy to carry out (Purnamasari, Mulyani, and Mulyani 2017). Students feel happy when learning to use this module, because the material in the module is

easy to understand and adds insight to students regarding the relationship between additive substance material and jenang Kudus.

The results of product feasibility test by media experts, material experts, science teacher responses, and the results of the student response trials, it is known that ethnoscience-based learning module product of Jenang Kudus on additive substance material is declared very feasible and has met the eligibility elements or criteria in a good module. The advantages of developing a science learning module based on Jenang Kudus ethnoscience on additive substance. The advantages of this module include:

a). Module is developed with a good appearance, equipped with pictures or illustrations on the material to provide comfort, and make it easier for students to understand the content of the material.

b). Module is equipped with simple experimental/practicum activities, practice questions, evaluation questions to help students find concepts from the material and train students' skills.

c). Module contains ethnoscience knowledge in the village of Kaliputu, Kudus which is associated with the theme of additive substance to increase students' insight.

D. **CONCLUSION**

This research produces a product in the form of a science learning module based on ethnoscience of jenang Kudus for class VIII SMP/MTs which has specifications including: physical characteristics of the module, material, and content of an ethnoscience-based module equipped with experimental activities, QR code for the process of making jenang Kudus, practice questions, self-assessment, and reflection. Based on the results of the validity test, it was declared very valid from the results of the percentage of validity of 95.83% from media experts and the results of the value of material experts obtaining eligibility of 84.44%. Further testing of the module development, obtained from the teacher's response questionnaire, which obtained a percentage of 90.33% and the results of the student response questionnaire, which obtained a percentage of 92.75% so that it included the criteria of "very good." Thus, from the results of the validity test, the teacher's response and the student's response, the ethnoscience learning module based on the ethnoscience of jenang Kudus was declared very feasible.

REFERENCES

Andriyani, P, M Masriani, and R Muharini. 2017. "Pengembangan Modul Zat Aditif Makanan Berbasis Kearifan Lokal Masyarakat Desa Rasau Jaya Umum." *Jurnal Pendidikan dan ….* https://jurnal.untan.ac.id/index.php/jpdpb/article/view/30034.

Arsih, Fitri, and Yuni Ahda. 2017. "Hasil Uji Validitas Buku Siswa Berbasis Inkuiri Pada Pembelajaran IPA Untuk Siswa Kelas VIII SMP." *Bioeducation Journal* 1(1): 54–59. http://ejournal.unp.ac.id/index.php/bioeducation.

Gustinasari, M., Lufri, & Ardi. 2017. "Pengembangan Modul Pembelajaran Berbasis Konsep Disertai Contoh Pada Materi Sel Untuk Siswa SMA." *Bioeducation Journal* 1(1): 2354–8363. http://ejournal.unp.ac.id/index.php/bioeducation/article/view/7154.

Nailiyah, M. R., Subiki, and Sri Wahyuni. 2016. "Pengembangan Modul Ipa Tematik Berbasis Etnosains Kabupaten Jember Pada Tema Budidaya Tanaman Tembakau Di Smp." *Jurnal Pembelajaran Fisika Universitas Jember* 5(3): 261–69.

Nilasari, Efi et al. 2016. "Pengaruh Penggunaan Modul." (2013): 1399–1404.

Ningtyas, E, A., W. Sumarni, and W. Christijanti. 2014. "Pengemban Modul IPA Terpadu Berbasis SETS Dengan Tema Hujan Asam Untuk Kelas VII SMP." *Unnes Science Education Journal* 3(1): 438–44. https://journal.unnes.ac.id/sju/index.php/usej/article/view/2970.

Prabowo, Chandra Adi, Ibrohim, and Murni Saptasari. 2016. "Pengembangan Modul Pembelajaran Inkuiri Berbasis Laboratorium Virtual." *Jurnal Pendidikan - Teori, Penelitian, dan Pengembangan* 1(6): 1090–97.

Purnamasari, Ita Dwi, Bakti Mulyani, and dan Sri Mulyani. 2017. "Penerapan Model Pembelajaran Tipe Contextual Teaching and Learning (CTL) Untuk Meningkatkan Minat Belajar Dan Prestasi Belajar Kimia Pada Materi Sistem Koloid Kelas XI MIPA 4 SMA Al - Islam 1 Surakarta Tahun Pelajaran 2015/2016." *Journal of Research and Advances in Mathematics Education*

5(3): 331 – 344.

Sari, Niken Purnama et al. 2020. "BIO-EDU : Jurnal Pendidikan Biologi Pengembangan Modul Pembelajaran IPA Berbasis Etnosains Materi Interaksi Makhluk Hidup Dengan Lingkungannya Untuk Menanamkan Jiwa Konservasi Siswa Kelas VII SMP 62-73:(2)5

Sarini, Putri, and Kompyang Selamet. 2019. "Pengembangan Bahan Ajar Etnosains Bali Bagi Calon Guru IPA." *Jurnal Matematika,Sains, dan Pembelajarannya* 13(1): 27–39.

Sudarmin. 2014. "Pendidikan Karakter, Etnosains Dan Kearifan Lokal." *Fakultas Matematika dan Ilmu Pengetahun Alam, UNNES*: 1–139. http://lib.unnes.ac.id/27040/1/cover_PENDIDIKAN_KARAKTER_SUDARMIN.pdf.

Ulfah, Maria, and Siti Nurul Hidayati. 2019. "Efektivitas Rencana Pelaksanaan Pembelajaran (Rpp) Berbasis Etnosains Untuk Meningkatkan Minat Dan Hasil Belajar Siswa Pada Materi Zat Aditif." *e-Jurnal Pensa* 07(01): 24–28.

Wardani, Indra Kusuma, and Galuh Tisna Widiana. 2018. "Pengembangan Lembar Kerja Siswa (LKS) Saintifik Berbasis Keterampilan Berpikir Kritis Untuk Siswa Kelas V SD/MI Di Kabupaten Jombang." *Jurnal Bidang Pendidikan Dasar* 2(1): 40.